Lat 40.34667 Lon -121.61189

Forest Health Protection

Pacific Southwest Region

Date: June 17, 2002
File Code: 3420

To: Park Superintendent, Lassen Volcanic National Park

Subject: Evaluation of Insect Activity at Headquarters Area, Lassen Volcanic National Park (NE02-04)

At the request of Jon Arnold, biologist, I conducted a field evaluation of the Headquarters area, (Mineral, CA) of Lassen Volcanic National Park on June 3, 2002. The objective of my visit was to assess the status of a western pine beetle (*Dendroctonus brevicomis*) infestation along the southern boundary of the Headquarters parcel and provide management recommendations as appropriate.

Background

The Headquarters area is occupied by a typical mixed conifer stand comprised of several large predominant ponderosa pine (*Pinus ponderosa*), sugar pine (*Pinus lambertiana*), incense cedar (*Libocedrus decurrens*) and white fir (*Abies concolor*). The dense understory consists of the same species with the exception of sugar pine.

Forest Health Protection personnel evaluated the Headquarters area in 1997 for insect and disease conditions (See Report # NE98-02). At this time it was determined that the vegetation was growing in an overstocked condition. Tree competition has been reduced through light hand thinning in some areas since the 1997 evaluation. Remaining areas with high stand densities,

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combined with drought conditions over the past couple of years, have increased tree stress and susceptibility to bark beetle attack.

Observations

Tree mortality and tree injury observed in the Headquarters area is mainly occurring in densely stocked stands of young ponderosa pine. Insects and other damaging agents observed within these stands include western pine beetle, *Ips* beetle and fire damage.

Western pine beetle (WPB) (See Appendix A) related mortality is occurring in approximately 15% of the ponderosa pine growing on Park Service land south of Highway 36 (near the ballpark). This is an overstocked stand of smaller diameter ponderosa pine with a few incense cedar. Infested trees range from approximately 6 to 20 inches in diameter. There is evidence that bark beetle associated mortality has been occurring on this site for the last couple of years, however, most of the mortality is from 2001 attacks. Woodpeckers, feeding on WPB larvae, have stripped most of the bark off currently infested trees and, it is suspected, are significantly reducing brood success in this particular stand. In the lower boles, where the bark remains intact, the remaining WPB are in the pupal stage of their development.

California fivespined Ips (*Ips paraconfusus*) (See Appendix A) activity was observed in green pine slash, on the north side of Highway 36 and south of the buildings, in a densely stocked area that was partially hand-thinned last fall. Material was not removed at the time of treatment and still remains moist enough to provide suitable habitat. This area consists of a few predominant ponderosa pine and incense cedar with a dense understory of the same.

A small group of ponderosa pine growing next to a burn pile was scorched last fall and received extensive crown damage. However, most of the buds within the scorched crowns survived the fire and are now putting out a new compliment of needles. These trees are not currently infested with bark beetles.

Discussion

Most of the stands observed at the south end of the Headquarters parcel currently meet or exceed full stocking levels for the site. This increased competition can cause moisture stress and increase susceptibility to attack by the western pine beetle. When periods of below normal precipitation are experienced, as was the case for 2000 and 2001, group killing of young, densely growing, even-aged stands of pure ponderosa pine can be expected. Even though last winter's precipitation was near normal, observations from previous droughts indicate that the response to increased moisture is not immediate and that a decline in mortality levels may not be apparent for an additional 1-2 years.

The landowners adjacent to LVNP have expressed concern about the likelihood of the mortality expanding into trees on their land. Observations of group kill dynamics in west-side Sierra Nevada stands do not suggest that western pine beetles consistently attack nearby pines upon emergence. Rather, the specific location of new group kills is unpredictable as beetles may fly for some unknown distance and direction before attacking a new host tree. Furthermore, the

private forested land adjacent to the Park Service land appears to have been thinned in the past and the stand density is currently below full stocking level. These trees are most likely in good health and growing vigorously. Trees in this condition are much less prone to successful bark beetle attack.

In order to reduce the susceptibility to future bark beetle related mortality, stands within the Headquarters area should be thinned to densities that are 80% or less of "normal". Past site evaluations have indicated that this level equates to about 275 sq. ft. / ac. basal area or less. When planning such thinning, it should be recognized that this is an average to be applied across the landscape and some variability may be desired. Individual high value trees, such as mature pine, as well as pure stands of younger ponderosa pine should benefit by having the stocking around them reduced to lower levels. Other areas with less valuable individual trees may tolerate higher stocking levels. It must be recognized that trees within these higher density stands will continue to be highly susceptible to bark and engraver beetle related mortality.

In addition to reducing tree stress, thinning and fuels treatment, especially of the understory, will somewhat reduce the risks and damage from any fire that might occur and provide a more defensible space. This is especially important where past bark beetle related mortality from the last drought period (1987-1992) has increased the amount of fuels within the current bark beetle infested stands. Thinning will also decrease the continued need to enter stands for hazard tree removal.

It is recommended that the *Ips* infested green slash be removed within the next 4-6 weeks before the engraver beetles emerge. A significant number of adults could emerge from the green slash and attack the residual pine. These attacks may result in top kill or whole tree mortality within the stand. To effectively lower this risk, all slash should be removed from the site. Material could be chipped or cut into firewood but should be hauled to another location, preferably to a sunny area away from any pine species, where significant drying could occur. Alternatively, this material could be piled and burned within 4-6 weeks if weather conditions permit.

It is important to minimize fire-related injuries to residual trees, particularly during periods of below normal precipitation. Older chip piles should be removed or be well dispersed within the stand rather than burned. Piles should not be burned if they are located near the boles of live trees. Prolonged exposure of roots and lower boles to lethal heating could kill trees outright or increase their susceptibility to bark and engraver beetle attack.

Forest Health Protection can assist with the funding of future prevention projects, which includes thinning and removal of material from overstocked stands, within Lassen Volcanic National Park. If you are interested in this funding please contact any of the Forest Health Protection entomology staff for assistance in developing and submitting a proposal.

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If you have any questions regarding this report or need additional information please contact me at 530-252-6431 or at dcluck@fs.fed.us.

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Appendix A – Insect Biology

Western Pine Beetle

The western pine beetle, *Dendroctonus brevicomis*, has been intensively studied and has proven to be an important factor in the ecology and management of ponderosa pine throughout its range. This insect breeds in the main bole of living ponderosa pine larger than about 4 inches in diameter. Normally it breeds in trees weakened by drought, overstocking, root disease, dwarf mistletoe or fire. Adult beetles emerge and attack trees continuously from spring through fall. Depending on the latitude and elevation, there can be from one to four generations per year.

The availability of suitable host material is a key condition influencing western pine beetle outbreaks. Under normal conditions the western pine beetle breeds in old or unhealthy trees, as well as those weakened by drought, overstocked stand conditions, or fires. In California, drought stress may be the key condition influencing outbreaks in that healthy trees undergoing sudden and severe moisture stress facilitate the buildup of western pine beetle populations. Healthy trees ordinarily produce abundant amounts of resin, which pitch out or eject attacking beetles. However, when deprived of moisture, stressed trees cannot produce sufficient resin flow to resist attack. Any condition that results in excessive demand for moisture, such as tree crowding, competing vegetation or protracted drought periods; or any condition that reduces that ability of the roots to supply water to the tree, such as mechanical damage, root disease, or soil compaction, can cause moisture stress and increase susceptibility to attack by the western pine beetle.

California Fivespined Ips

The California fivespined ips, *Ips paraconfusus*, is typically found west of the crests of the Sierra Nevada and Cascade Mountains from northern Oregon to southern California and attacks most species of pine throughout its range. The California fivespined ips attacks fresh pine slash of almost any diameter. Over wintering adults, emerging in the early spring, are much more successful breeding in fresh slash than in trees. Large populations can build up if slash is available and emerging beetles may attack nearby trees. Broods develop most successfully in shaded slash or on the underside of logs. These broods emerge by mid-summer and may kill nearby trees beginning to experience moisture stress. Tree mortality caused by California fivespined ips is generally limited to scattered trees under stress. However, during droughts when many trees are under stress, this beetle can cause widespread mortality and top killing. Depending on the latitude and elevation, there can be from two to five spring/summer generations with an additional over wintering generation per year.